Amendments to the Claims

Claims 1-42 (canceled).

43. (newly added) A method comprising

a DNA ligation operation and an amplification operation,

wherein the DNA ligation operation comprises circularization of an open circle probe, wherein circularization of the open circle probe is dependent on hybridization of the open circle probe to a target sequence,

wherein the amplification operation comprises rolling circle amplification of the circularized open circle probe to produce tandem sequence DNA, wherein rolling circle amplification is primed by a rolling circle replication primer, a secondary DNA strand displacement primer, and a tertiary DNA strand displacement primer,

wherein the rolling circle replication primer and tertiary DNA strand displacement primer are complementary to the circularized open circle probe, wherein the secondary DNA strand displacement primer matches sequence on the circularized open circle probe, wherein the secondary DNA strand displacement primer is not complementary to the complement of either the rolling circle replication primer or the tertiary DNA strand displacement primer.

44. (newly added) The method of claim 43 wherein the target sequence is coupled to a specific binding molecule, wherein the specific binding molecule can interact with a target molecule.

45. (newly added) The method of claim 44 wherein the target molecule is a protein.

46. (newly added) The method of claim 44 wherein the target molecule is a nucleic acid molecule.

47. (newly added) A method of amplifying nucleic acid sequences, the method comprising,

(a) mixing one or more open circle probes with a target sample comprising one or more target sequences, to produce an OCP-target sample mixture, and incubating the OCP-target sample mixture under conditions that promote hybridization between the open circle probes and the target sequences in the OCP-target sample mixture,

(b) mixing ligase with the OCP-target sample mixture, to produce a ligation mixture, and incubating the ligation mixture under conditions that promote ligation of the open circle probes to form amplification target circles,

(c) mixing a rolling circle replication primers, a secondary DNA strand displacement primers, and a tertiary DNA strand displacement primers with the ligation mixture, to produce a primer-ATC mixture, and incubating the primer-ATC mixture under conditions that promote hybridization between the amplification target circles and the rolling circle replication primer in the primer-ATC mixture,

wherein the rolling circle replication primer and tertiary DNA strand displacement primer are complementary to one or more of the amplification target circles, wherein the secondary DNA strand displacement primers match sequence on one or more of the amplification target circles, wherein the secondary DNA strand displacement primers are not complementary to the

complement of the rolling circle replication primers or the tertiary DNA strand displacement primers, and

(d) mixing DNA polymerase with the primer-ATC mixture, to produce a polymerase-ATC mixture, and incubating the polymerase-ATC mixture under conditions that promote amplification of the amplification target circles,

wherein amplification of the amplification target circle results in the formation of tandem sequence DNA.

48. (newly added) A method of amplifying nucleic acid sequences, the method comprising,

(a) mixing a rolling circle replication primer, a secondary DNA strand displacement primer, and a tertiary DNA strand displacement primer with one or more amplification target circles, to produce a primer-ATC mixture, and incubating the primer-ATC mixture under conditions that promote hybridization between the amplification target circles and the rolling circle replication primers in the primer-ATC mixture,

wherein the amplification target circles each comprise a single-stranded, circular DNA molecule, wherein the rolling circle replication primers and tertiary DNA strand displacement primers are complementary to one or more of the amplification target circles, wherein the secondary DNA strand displacement primers match sequence on one or more of the amplification target circles, wherein the secondary DNA strand displacement primers are not complementary to the complement of the rolling circle replication primers or the tertiary DNA strand displacement primers, and

(b) mixing DNA polymerase with the primer-ATC mixture, to produce a polymerase-ATC mixture, and incubating the polymerase-ATC mixture under conditions that promote amplification of the amplification target circles,

wherein amplification of the amplification target circles results in the formation of tandem sequence DNA.

49. (newly added) A method for detecting target molecules, the method comprising an amplification operation,

wherein a reporter binding agent and a target molecule are brought into contact, wherein the reporter binding agent comprises a specific binding molecule and an oligonucleotide, wherein the specific binding molecule interacts with the target molecule, wherein an amplification target circle and the reporter binding agent are brought into contact,

wherein the amplification operation comprises rolling circle amplification of the amplification target circle to produce tandem sequence DNA, wherein rolling circle amplification is primed by the oligonucleotide of the reporter binding agent, a secondary DNA strand displacement primer, and a tertiary DNA strand displacement primer.

50. (newly added) A method for detecting target molecules, the method comprising an amplification operation,

wherein a reporter binding agent and a target molecule are brought into contact, wherein the reporter binding agent comprises a specific binding molecule and an oligonucleotide, wherein the oligonucleotide comprises an amplification target circle, wherein the specific binding molecule interacts with the target molecule,

wherein the amplification operation comprises rolling circle amplification of the amplification target circle to produce tandem sequence DNA, wherein rolling circle amplification is primed by a rolling circle replication primer, a secondary DNA strand displacement primer, and a tertiary DNA strand displacement primer,

wherein the rolling circle replication primer and tertiary DNA strand displacement primer are complementary to the amplification target circle, wherein the rolling circle replication primer and tertiary DNA strand displacement primer are not complementary to the same sequence on the amplification target circle, wherein the secondary DNA strand displacement primer matches sequence on the amplification target circle, wherein the secondary DNA strand displacement primer is not complementary to the complement of either the rolling circle replication primer or the tertiary DNA strand displacement primer.